Portable grain moisture meter

G650*i*

USER MANUAL

Summary

Introduction

The G650*i* moisture meter includes all the characteristics to provide the most accurate grain moisture reading.

With a simple operation and without operator intervention, model G650*i* will provide moisture readings in a few seconds, for a wide variety of products.

With a simple 5-key keypad, the instrument can be operated and quickly set up, without intensive user training.

By applying the "FLOW THRU" technology, G650*i* provides a fully automatic moisture analysis. There is no need of previous sample weighing; temperature, density and weight corrections are automatically performed, without the use of any other resource or additional tables.

Calibration curves for each cereal have been obtained at Gehaka laboratories, using samples collected from several areas of the plantation. Using the standard oven method as a reference, measurement scales for each product were developed. These curves were transferred to the G650*i* memory and they are easily identified by product name and their version.

If the development of new calibration curves is necessary, there is a function at www.medidoresdeumidade.com which allows creating, editing and installing them in your G650*i* moisture meter.

G650*i* includes three instruments into one, managed by a state-of-the-art internal microprocessor. These three instruments are: one electronic scale, which measures the sample weight; one built-in digital thermometer, which measures the sample temperature inside the chamber and the G650*i* temperature and finally one capacity meter, which indicates the moisture percent, to be later corrected by the other parameters.
Its program performs all the necessary calculations, thus providing extremely reliable and repeatable readings.

It also performs: automatic setting and checking the proper operation of all electronic circuits.

The design of FLOW THRU instrument allows the performance of quick measurements, namely, in less than 15 seconds and without the operator intervention, in a fully automatic way. Just select the product, pour the sample in the G650*i* weighing cup, until a "BEEP" is given, the G650*i* will load the sample, perform the measurements and will automatically unload the sample. After a few seconds, you will have the moisture and temperature measurement, all this shown on an easy to read 16-character / 2-line alphanumeric LCD display, in Portuguese.

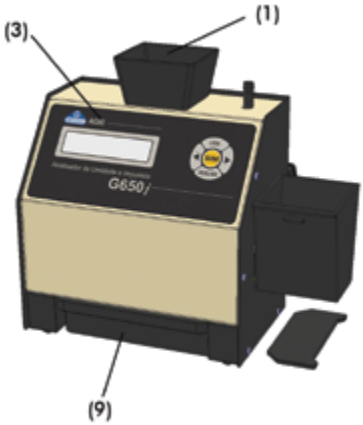
G650*i* has also a bidirectional RS232C serial communication port.
With this, we can connect the G650*i* to a printer so the measurement is printed on a label, thus making the counterchecking easier, or else, we can connect the meter to a PC and transfer the information to a managing system.

The G650*i* is operated by an external FULL RANGE automatic power source, which means the instrument operation is ensured for 90-240 VAC mains, thus protecting the instrument from network voltage variations.

Indication conventions for G650*i* display:

ON	Connect the G650*i*.
->	Right-hand arrow.
<-	Left-hand arrow.
YES	Option acknowledgment.
OFF	Exit, off.

Description



1. SAMPLE LOADING HOPPER
Place where the cereal sample, to have the moisture measured, will be poured.

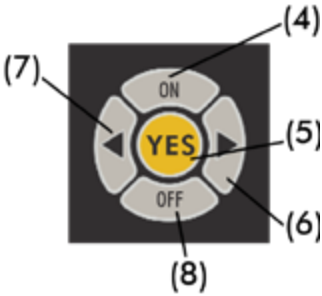
2. DISCHARGE PUSHBUTTON
By means of this button we will discharge the sample from the Measuring Chamber. It will be used at the end of moisture measurements.

3. LCD DISPLAY
Displays results and settings with alphanumeric characters.

4. LIGA (ON)
Connects the G650*i*.

5. YES
Confirms function or setting selection.

6. RIGHT-HAND ARROW
It displays the next function or increases the value by one scale interval.



7. LEFT-HAND ARROW
Displays the previous function or decreases the value by one scale interval.

8. OFF (ESCAPE)
Switches off G650*i*, exits a function or setting.

9. DRAWER
Receives the cereal sample from the chamber, after the measurement was performed.

10. AC ADAPTER

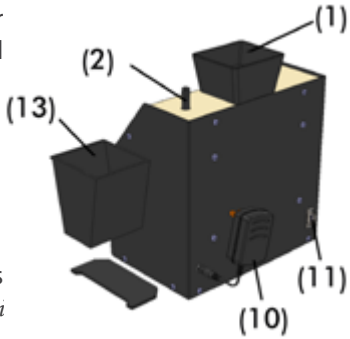
A converter with switchable 90 – 240 VAC power source; if disconnected, operation via internal 9V battery will start.

11. RS232 SERIAL PORT CONNECTOR

Data output for printer or PC.

12. HARD LOCK (KEY)

When connected to RS232 serial output, it releases access to "Configuration" function, where G650*i* configurations will be made.

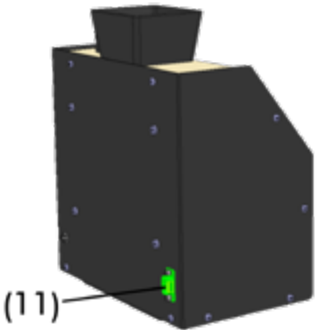


13. WEIGHING CUP

Sample receiving device for weighing purposes and used to pour out the sample from the Weighing Cup. It can also be used as a standard volume for measuring the cereal density (kg/hL).

14. SCRAPER

Used for wiping off the grain excess when the grain density measurement is performed.



G650*i* installation

Carefully check the packing, if there were marks and damages in the cardboard case, this means that there were problems during shipment.

Open the packaging, checking the conditions of G650*i*. Remove the equipment and check whether all its accessories are included.

Place the G650*i* on a stable table, in order to ensure it will not move during the operation. Remove the adhesive tapes fastening the Drawer and check whether it slides easily.
Connect the AC Adapter to the connector on the rear panel and fit it steadily, taking care that the plug is fully inserted in the connector.
It is not necessary to verify the mains voltage; the power supply is Full Range, not requiring mains selection. We also do not recommend the use of voltage stabilizers.

When the ON key is operated, G650*i* will start its operation, performing a self-diagnosis in order to check whether its components are working properly. If, by any chance, the instrument verifies that some of its components is improperly operating, it will indicate an error message on the display regarding the fault.

The G650*i* can operate connected to the power outlet or using the internal 9V battery. This switching is automatically performed. It should be noted that during operation via 9V battery, the Display Backlight will be switched off in order to save battery energy. When the G650*i* is initialized, during the self-diagnosis a percentage figure is displayed indicating the battery status, as follows:

30% - 100%	Normal operation.
0% - 30%	Request of battery exchange or recharging.
0%	Indication of low battery, G650*i* stops operating.

Function "4. Battery" indicates battery voltage in addition of its status in a percentage figure.

The G650*i* shall be operated in a place free of excessive dust and with room temperature between 0º and 40ºC.

Diagram of the functions

A diagram follows indicating all G650*i* functions and it will help to understand the operation.

CONNECT:
- 1. Measuring
  Performs the moisture measurement. The cereal will be selected, the weighting is made, and we will have the moisture content. To measure again, just pour the new sample in the hopper.
- 2. Percent
  Performs the weigth and percent measurement of a sample. YES key tares, Left-Hand Arrow programs 100%. Right-Hand Arrow sends report and Escape exits function. The maximum load is 700g with 0.1g scale interval.
- 3. Density
  Performs the weight and density measurement of a sample. Fill the weighting cup with a sample and wipe off the excess. YES key tares, Left-Hand and Right-Hand Arrow sends report and Escape exits function.
- 4. Indicates the battery status. Percent indications shows how much of battery capacity is left
  Left-Hand and Right-Hand Arrow sends report and Escape exits function.
- 5. Configuration
  - 5.1 Adjusting Dante and Time
    Performs the adjustment of date and time used in the reports. use the Arrows and YES to perform the adjustment.
  - 5.2 Adjusting the Number os Elements of the Average Value.
    Performs the adjustment of the number of measurements to be used for making the average. We can select between 1 and 5 measurements.
  - 5.3 Adjusting the Number os Decimal Digits
    This function makes the adjustment of the number of decimal digits shown on the display and in the moisture reports.
  - 5.4 Adjusting the Print Mode
    Sends the print to printer or PC. The PC report only sends data.
  - 5.5 Adjusting the Number of Report Copies
    Adjust the number of copies to be sent to the printer, adjustable from 1 to 5 copies
  - 5.6 Adjusting Contrast
    Adjust the contrast between 65% and 100%, and 100% is the maximum contrast.
  - 5.7 Uploadinf Internet Equation
    Allows G650i to be remotely controlled by a PC and to download the curves.
  - 5.8 Uploading Standard Equation
    Uploads equations built into the G650i. All the equations will be programmed and they may not be the most updated.
  - 5.9 Self-Report
    Performs a self-diagnosis on G650i, and issues a report with all data.
  - 5.10 Languase Selection
    Selects the languase used by G650i: Portuguese, Spanish, English, French, German and Italian.
  - 5.11 Automatic Shutoff
    Activates or not the auto shutoff function in 5 minutes without touching the keypad, it serves to save battery charge.

1. Measuring – moisture measuring

1. Select “Measuring” from the main menu, depress YES to confirm;

2. Select the type of cereal you want to know the moisture content. Use Right hand Left hand ARROW keys until finding the desired product. Indications below the product names are the moisture minimum and maximum limits the G650*i* meter is able to make the reading. Depress “YES” to confirm your choice.

3. Take a sample of at least 200g of the product you want to know the moisture content and, using the plastic scoop, slowly pour the cereal sample into the weighing cup, until 100% is shown on the display, a beep will be heard indicating the sample weight is correct. If by any chance the weight is exceeded, the display will show a value higher than 100%, and the sample excess shall be removed from the weighing cup.

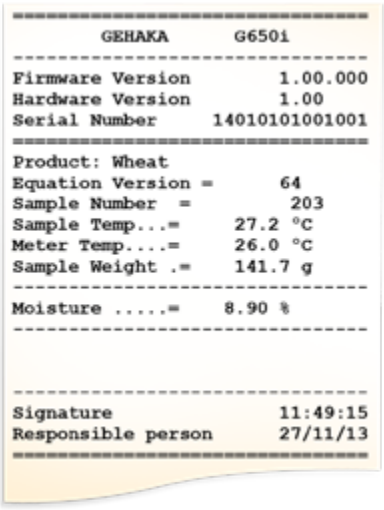
4. Pour the weighed sample into the Loading Hopper of G650*i*, using the edge of the Weighing Cup as a reference. The sample shall be poured quickly, do not pour slowly because the instrument repeatability is reduced.

5. Within a few seconds, the G650*i* meter will display the value of product moisture. If the Right hand/Left hand keys are depressed, the G650*i* meter will display all the measurements made, namely:

When selecting Right hand/Left hand Arrow we have:

-> Sequence number of the measured sample.

6. After having performed a successful measurement, the G650*i* meter will send all measurement data through the serial output to the printer or PC. An example of report follows:



Note: If there is a great temperature difference between the product and the G650*i* Chamber, where the Temperature Sensor is located, the meter will wait until there is a thermal balance between both of them. This could make the temperature measurement taking more time to be made. This way, we improve the meter precision, by measuring the actual sample temperature.

7. After making the reading, discharge the Chamber using the discharge pushbutton.

8. When the G650*i* meter is showing the measurement results on the display and a new sample is poured into the Weighing Cup, the G650*i* meter will perform a new measurement, using the same configuration of the previous measurement. If the ESCAPE key is depressed, the MEASUREMENT option will be exited, returning to the main menu.

Note: If the moisture content is higher than 22%, the G650*i* meter will request measuring again the same sample, repeating the measurement three times in order to ensure a higher reading precision.

2. Percentage (impurities)

The Percentage function is used to calculate the Impurity percentage; in a simple and quick way we obtain the results, performing the following procedures:

1. Take the sample you want to know the impurity contents, in a representative way regarding the batch being examined. The sample shall weigh at least 50g.

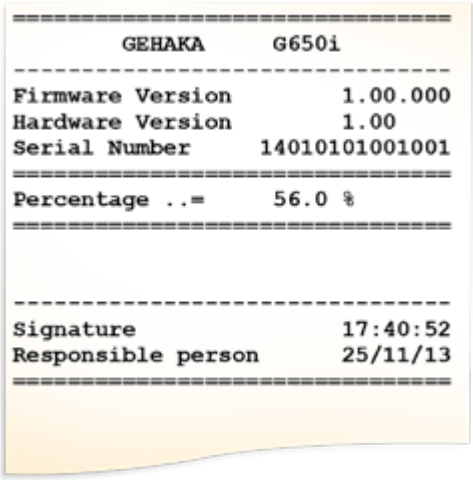
2. If the scale is not indicating the 0g reading, use the YES key for taring (zeroing) the scale.

3. The percentage function starts considering a calculation basis weight of 250g. Therefore, the sample that is poured will indicate the Percentage considering as a basis the initial value of 250g.

4. For programming 100%, depress the LEFT-HAND ARROW, immediately the weight value on the display will be the calculation basis, and we will have a 100% indication. The minimum weight value for the correct operation of the function is 50g, with lower values the function does not program 100%. The scale maximum load is 700g.

5. Pour the sample from the Weighing Cup on the sieve, sieve it and pour back into the Weighing Cup the impurities found, the G650*i* will indicate their percentage.

6. If the RIGHT-HAND ARROW is depressed, a report with the result will be printed, as shown below:



7. To complete this function, depress OFF (ESCAPE), a summary of the key actions on this function follows:

YES KEY:	Tares (zeroes) the Scale;
LEFT-HAND ARROW KEY:	Programs 100%;
RIGHT-HAND ARROW KEY:	Sends a report through the Serial port;
OFF KEY:	Exits the function.

3. Approximate density (hectoliter weight)

The Density function is used to perform the approximate density (specific weight) calculation of the cereal, or as it is commonly known the Hectoliter Weight. The unit of measure is kg/hL Perform the following procedures:

1. Take the sample you want to know the Density, in a representative way regarding the batch being examined.

2. Install the Weighing Cup on the G650*i*. If the scale is not indicating the 0g reading, use the YES key for taring (zeroing) the scale.

3. Remove the Weighing Cup from the G650*i*, place it on a table and pour the sample until it richly overflows the cup. The overflow is important to standardize the amount of grains inside the Cup.

4. Wipe off the Weighing Cup using the Scraper. Make a slow movement removing the excess of grains in the Cup. If necessary wipe off more than once, and leave the grains leveled to the Cup edge. The measurement quality depends on this precaution.

5. Place the Weighing Cup back on the G650*i*, it will indicate the sample Density considering the Weighing Cup volume and the sample weight. The scale maximum load is 700g.

6. If the RIGHT-HAND ARROW is depressed, a report with the result will be printed, as shown below::

```
================================
        GEHAKA      G650i
--------------------------------
Firmware Version          1.00.000
Hardware Version          1.00
Serial Number       14010101001001
================================
Density ....=  70.0 kg/hL
================================


--------------------------------
Signature                 11:40:54
Responsible person         27/11/13
================================
```

7. To complete this function depress OFF (ESCAPE), a summary of the key actions on this function follows:

YES KEY:	Tares (zeroes) the Scale;
LEFT-HAND ARROW KEY:	Sends a report through the Serial port;
RIGHT-HAND ARROW KEY:	Sends a report through the Serial port;
OFF KEY:	Exits the function;

4. Battery

The Battery function is used to perform the measurement and indicate status at that time. Its main usefulness is to prevent the power failure during an external measurement. Perform the following procedures:

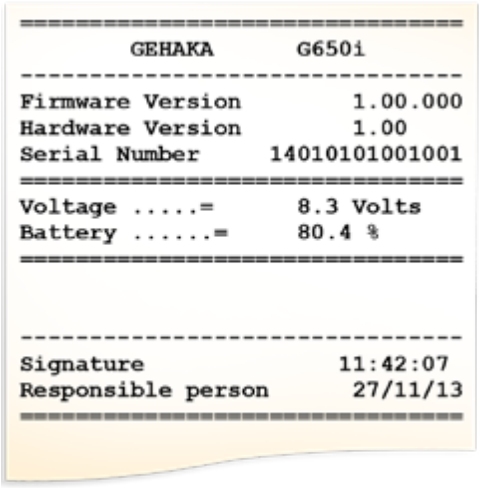
1. Depress YES to enter the "Battery" function. A screen will be shown indicating the Battery voltage and remaining service life percentage. It is possible that a new battery indicates a percentage higher than 100% and it will be considered discharged when indicates 0%. It should be noted that the system only switches to Battery when the Power Adapter is removed from the mains.

2. There are two errors that the Battery measuring system shows, namely:

This error indicates that an unsuitable Adapter is being used to energize the G650*i*, there is a high risk of damaging the equipment electronics, please immediately remove the source being used and purchase from Gehaka a new mains Adapter.

This error shows that the battery service life is over, please replace the battery as shown further on this manual.

3. If the RIGHT-HAND ARROW is depressed, a report with the result will be printed, as shown below:



4. Gehaka even provides an optional item that is a Rechargeable Battery for G650*i*. This Battery has the same mechanical appearance of the disposable Battery, but it is a Nickel Cadmium rechargeable Battery.

Only in this case the mains Adapter will be another one with a voltage of 12 volts, enough to recharge the Battery in 12 hour charging. To verify whether the battery was fully recharged, observe the charge percentage in this function, it

should reach nearly 120%, and at that moment the Adapter may be removed from mains. The expected autonomy for this Battery is 10 hours of continuous operation. There may be variations depending on the battery model used.

To enhance battery duration, have always connected the "5.11 Auto Shutoff" function.

5. To complete this function, depress OFF (ESCAPE), a summary of the key actions on this function follows:

YES KEY:	No effect on this function;
LEFT-HAND ARROW KEY:	Sends a report through the Serial port;
RIGHT-HAND ARROW KEY:	Sends a report through the Serial port;
OFF KEY:	Exits the function;

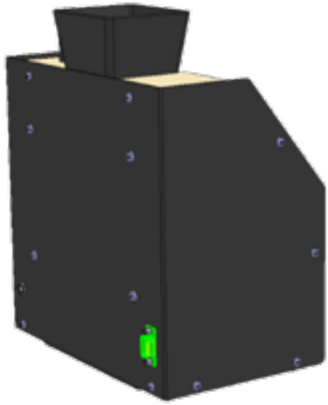
5. Configuration

The "Configuration" mode offers the possibility to make settings or configurations in the G650*i* meter. Now, we will describe each one of these functions.

The "Configuration" mode offers the possibility to make settings or configurations in the G650*i* meter. Now, we will describe each one of these functions.

Note that the number shown at the start of each function corresponds to the same shown in the G650*i* Menu, this way it is easier to identify in the manual where the explanation of each function is.

If the Hard Lock key is not connected to the G650*i* Serial Port and the access to this function is attempted, the display will show an error message "Access locked, use the Hard Lock" stating the need of the key presence.



If you wish, remove the key after entering the "Configuration" function, there is not a new checking. When you exit the function, it will be locked again.

G650*i* settings and Equations can only be changed with the presence of the Hard Lock key, this ensures improved security.

5.1. Date and time adjustment

This function makes the Date and Time adjustment of the real time clock (RTC). This value of date and time will be sent in the reports through RS232 Serial Port after the measurement.

G650*i* is already delivered with the clock adjusted at the factory, but it may eventually be readjusted for the daylight saving time.

There is an internal battery that keeps the clock working even when the G650*i* meter is disconnected from the power outlet.

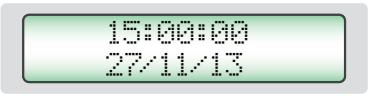
This battery lasts for over 5 years; to have it tested, just disconnect the G650*i* meter and see if the clock indicates 00:00:80, if this happens, contact Gehaka Service to replace the battery.

To perform the Date and Time adjustment:

1. Go to "Configuration" and depress YES; you have to put the Hard Lock in the serial output;

2. Go to function "5.1 Date and Time Adjustment" and depress YES;

3. Now use the Right hand/Left hand ARROWS to Increase or Decrease the value of the TIME. When the value is right, depress YES and the G650*i* will go to the next field to be adjusted;



4. Repeat this procedure for adjusting MINUTES, DAY, MONTH, and YEAR.

Note: The value being adjusted will be shown underlined, after depressing YES it will go to the next item to be adjusted.

5.2. Adjusting the number of elements to be averaged

This function adjusts the number of elements to make up the average of readings used to calculate the final value of moisture percent. We can select between 1 and 5 elements.

To adjust the number of elements to be averaged:

1. Go to "Configuration" and depress YES; you have to put the Hard Lock in the serial output;

2. Go to function "5.2 Adjusting the Number of Elements to be Averaged", and depress YES;

3. Now use the Right hand/Left hand ARROWS to Increase or Decrease the Number of Elements to be Averaged. This adjustment is limited between 1 and 5 elements;

4. Depress YES to complete the adjustment.

Note: It should be noted that, irrespective of the adjustment made in this function, when the moisture content exceeds 22% there will be ALWAYS made a reading with the average value of three elements.

5.3. Adjusting the uumber of decimal digits

This function makes the adjustment of the decimal digits shown on the display and in the moisture reports. If one decimal digit is used, the rounding of the second decimal digit will be automatically made. The factory default setting is one decimal digit.

To adjust the number of decimal digits:

1. Go to "Configuration" and depress YES; do not forget to put the Hard Lock in the serial output;

2. Go to function "5.3 Adjusting the number of decimal digits", and depress YES;

3. Now use the Right hand/Left hand ARROWS to increase or decrease the number Decimal Digits. This adjustment is limited between 1 and 2 decimal digits;

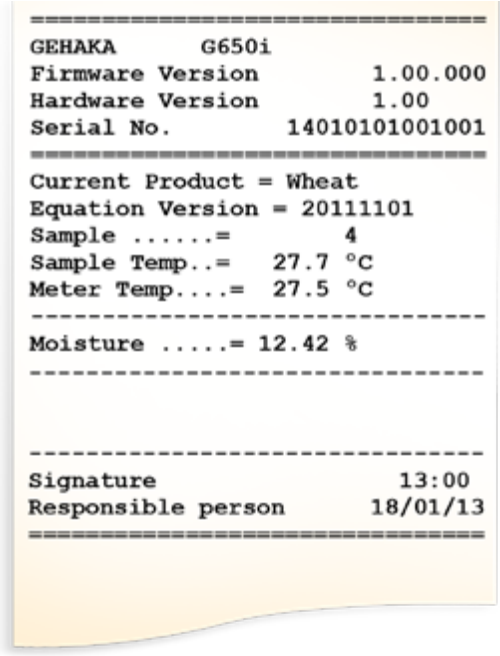
4. Depress YES to complete the adjustment.

5.4. Adjusting the print mode

This function sends the measurement data to a printer or PC.

A. Printer:

In this mode, measurement data in a report format will be sent, as stated below, through the Serial Port RS232.
If the G650*i* meter has a built-in Thermal Printer, this report will be printed and simultaneously sent through the Serial Port RS232.



B. Computer:

The Computer Mode just sends the data, without considering formats. The data is separated by ";" in order to make the separation easier. This report may be easily captured and interpreted by a computerized system connected to the RS232 Serial Port.

See below an example of the String that is sent. The ending is with CR and LF.

```
15; 12.35; 141.7; 0.0; 26.9; 27.4; 66.4; Wheat; 20111101;G650i;
1.00.000;1.00;16:51; 18/01/13;<CR><LF>
```

Description of data fields sent:

```
Sample;
Moisture;
Weight;
Density;
Sample Temperature;
Instrument Temperature;
Scale _ A (Capacitance);
Product Name;
Equation Version;
Instrument Model;
Firmware Version;
Hardware Version;
Time;
Date;
<CR><LF>
```

To perform the print mode selection, proceed as follows:

1. Go to “Configuration” and depress YES; do not forget to put the Hard Lock in the serial output;

2. Go to function “5.4 Adjusting print mode”, depress YES;

3. Use Right hand/Left hand ARROW keys to select between the two printing modes, printer or computer;

4. Depress YES to complete the adjustment.

5.5. Adjusting the number of report copies

This function allows selecting how many copies of the printing report will be generated.

We may select from 0 to 5 copies, where 0 copies means not printing the report. For each copy sent, a new screen will show up requesting to tear the paper and to press YES to the next copy to be printed.

To select the number of copies proceed as follows:

1. Go to “Configuration” and depress YES; do not forget to put the Hard Lock in the serial output;

2. Go to “5.5 Adjust Nr. Print Copies”, depress YES;

3. Use Right hand/Left hand ARROW keys to select between the two printing modes, printer or computer;

4. Depress YES to complete the adjustment.

5.6. Adjusting the contrast

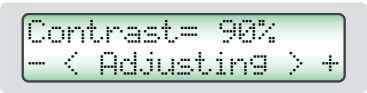
This function allows adjusting the contrast of the LCD display.
This value can be adjusted between 55% and 100%, and 100% is the maximum contrast.
This value will be stored in the G650*i* memory.

To adjust the contrast:

1. Go to “Configuration” and depress YES; do not forget to put the Hard Lock in the serial output;

2. Go to function “5.6 Contrast Adjustment” and depress YES;

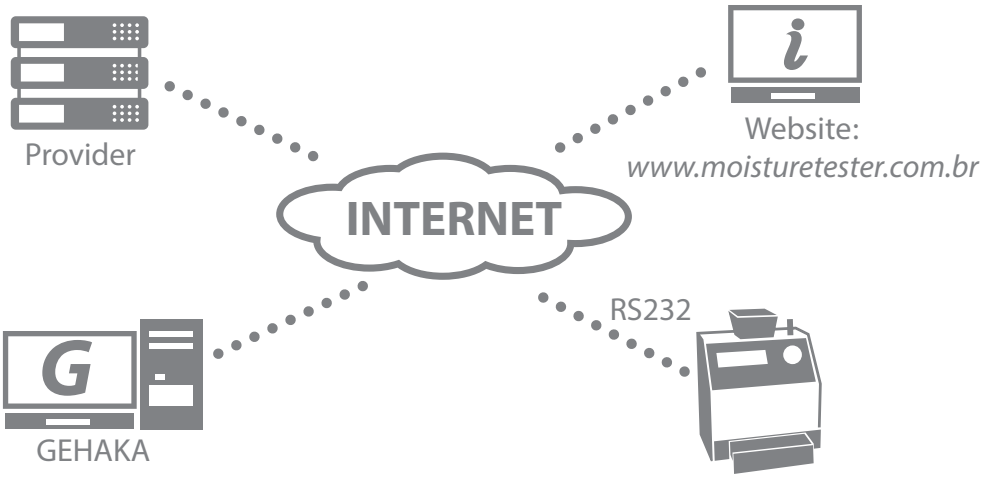
3. Use the Right hand/Left hand ARROWS to increase or decrease the Contrast value. This adjustment is made in 5% steps;



4. Depress YES to complete the adjustment.

5.7. Uploading Internet equation

One great innovation of G650*i* is the possibility of using the Internet to perform a customization of the products the G650*i* will measure. All this information, news and the guidance to execute them may be accessed at ***www.moisturetester.com.br.***



Basically we can:

- Register your G650*i*. This register entitles to an extension of six months of the Warranty; do not lose this opportunity. It also allows us to know which scales are more important to you, and allows us to keep you informed about new updates, including improvements in G650*i* firmware.

- Selecting which products will be sampled by G650*i*. With this, the time for changing scale is reduced, thus making the operation easier. Also a backup of the G650*i* Equations in the cloud will be made, thus ensuring their return to the instrument, even if it were totally damaged.

- Updating the equations as soon as they are reviewed. Gehaka works around the year reviewing scales of the G650*i* meters, or developing new ones, however, before the equipmenthad to be carried to the Service to receive these updates.

Now with the use of the Internet you will receive an e-mail telling that there was a review of a Product that is in your equipment and, in a few minutes, connected to a PC, it can be updated.

- Creating new Equations. It is possible, starting from a "Universal Scale", to create a new equation for a product the G650*i* does not have. Just set up a table with the readings of the Standard and those obtained in the G650*i* and in a few minutes you will create a new Equation and you will be able to install in your G650*i*. Through our website you will get all the support for the creation.

Connecting the G650*i* to a PC is quite simple: Just follow the steps below:

1. The computer must be connected to the Internet, otherwise it will not be possible to download the necessary files for the installation;

2. Find an unused USB port in the PC;

3. Connect the Serial Cable supplied with the G650*i* to the RS232 serial port, do not still connect to the G650*i*;

4. Wait for the driver installation, this could take up to 5 minutes, depending on the Internet bandwidth. This step will only be executed the first time the Cable is connected to the PC, after this the PC will automatically recognize the Serial Cable;

5. Connect the G650*i*;

6. Place the Hard Lock in the Serial Port of G650*i*;

7. Select the "Configuration" function and depress YES;

8. Select the "5.7 Uploading Internet Equation" function;

9. Remove the Hard Lock and connect the Cable in the Serial Port of G650*i*;

10. Access the website ***www.moisturetester.com.br*** and click on the "Moisture Meter".

11. From now on, follow the instructions shown in the PC, which assumes the control of G650*i*. All the operations stated in the site may be performed.

12. Register your G650*i*, this will bring many advantages.

How to exit “5.8 Uploading Internet Equation” function

This function passes the control of the G650*i* processor to the computer to which it is connected. Once having entered in this function, we have only two alternatives to exit:

A. Exit with the site commands;

B. Disconnecting, waiting for 5 seconds, and connecting again the power supply to G650*i*.

5.8. Uploading standard equation

This function shall be only used in case of occurring some fault in the download of Internet curves of G650*i*. In this function, the standard equations built into the G650*i* will be uploaded, and they may not be the most updated. Moreover, there is no way to select them, so all the equations will be uploaded.

The equations undergo updates with time, and we strongly recommend that an Internet connection be made in order to download the most updated curves.

To upload standard equations:

1. Connect the G650*i*;

2. Go to “Configuration” and depress YES; do not forget to put the Hard Lock in the serial output;

3. Go to “5.8 Uploading standard equation” function, depress “YES”, a new message will show up indicating the upload of products in the memory:

4. The system automatically completes this function.

5.9. Self-report

Makes a self-diagnosis of G650*i*, and issues a report with all data. The report will be sent to serial output RS232 or to the thermal printer connected to G650*i* serial port.

To get the report:

1. Connect the G650*i*;

2. Go to "Configuration" and depress YES; do not forget to put the Hard Lock in the serial output;

3. Go to "5.9 Self-report" function as depress YES;

4. On the screen several information will show up related to G650*i* self-report, at the end we will have the message below stating the report printing:

5. Wait for the report to be printed;

This report provides the Service with data for assessing whether the G650*i* is operating properly, after having passed through the self-diagnosis when it is connected.

Note that there are two groups of information, the first one indicates the G650*i* operation, the second one the Products that are available in G650*i* with the Calibration Curve Version and the minimum and maximum moisture values.

Below there is an example of reports and the expected values for each item with its respective tolerance:

```
================================
GEHAKA      G650i
Firmware Version         2.00.026
Hardware Version         1.00
Serial No.          14010101001001
================================
Current Sample =    271
Current Product = Wheat
Equation Version =      64
Temp. Chamber  =    27.8°C
Instrum. Temp. =    27.9°C
Chamber Freq.= 249.59 KHz
A/D Reading.. = 2109.0 Sc Int
--------------------------------
| Moisture Range per Product   |
|------------------------------|
| Product         | Ver |Min|Max|
|-----------------|-----|---|---|
|Natural Almond   |  119|  3| 30|
|Peanut           |  120|  1| 30|
|Nat. Proc. Rice  |   67|  5| 30|
|Nat. Rough Rice  |   65|  7| 30|
|Oat              |    2|  6| 22|
|Oat Husk         |  121|  7| 35|
|Cocoa 100 g      |  124|  4| 18|
|Cocoa 142 g      |  170|  8| 25|
|Coffee           |  125|  9| 25|
|Coffee ISO6673   |  163|  7| 22|
|Soybean          |   73|  8| 35|
|Sorghum          |   72|  7| 40|
|Wheat            |   64|  5| 40|
|Triticale        |   56|  5| 33|
|Urucum Seed      |  161|  7| 30|
================================


--------------------------------
Signature               09:54:29
Responsible person      03/12/13
================================
```

```
Indicates the number of current sample.
Selected product.
Numerical version of Product equation.
Sample temperature.
G650i Temperature.
Measuring Chamber Frequency.
A/D Reading
```

5.10. Language selection

Selects the language used by G650*i*.
Available languages in this version: Portuguese, Spanish, English, French, German and Italian.

To select language proceed as follows:

1. Connect the G650*i*;

2. Go to “Configuration” function and depress YES; do not forget to put the Hard Lock in the serial output;

3. Go to “5.10 Language selection” function, and depress YES;

4. Use the Right hand/Left hand ARROWS to select the required language;

5. Depress YES to complete;

5.11. Auto shutoff

Switches on/off the Battery economy mode. When it is activated, it switches off the G650*i* after 5 minutes without the keypad being operated, thus saving Battery charge. The factory default setting is with the function activated.

To select proceed as follows:

1. Connect the G650*i*;

2. Go to “Configuration” function and depress YES; do not forget to put the Hard Lock in the serial output;

3. Go to “5.11 Auto shutoff” function and depress YES;

4. Use the Right hand/Left hand ARROWS to select the required mode;

5. Depress YES to complete;

RS232 Serial Port

Set up the printer or the PC with which the G650*i* is connected with the following configurations:

Serial RS232C Protocol:

Baud Rate	4800 bps
Bits	8 Bits
Parity	None
Stop Bit	1 bit

This information shall be used to program the peripheral, PC or printer that is connected to G650*i*.

In case G650*i* is not transmitting data and the PC is not receiving the information, observe the following items in your PC:

1. Verify whether the system is selected to the COM port that is connected to G650*i*.

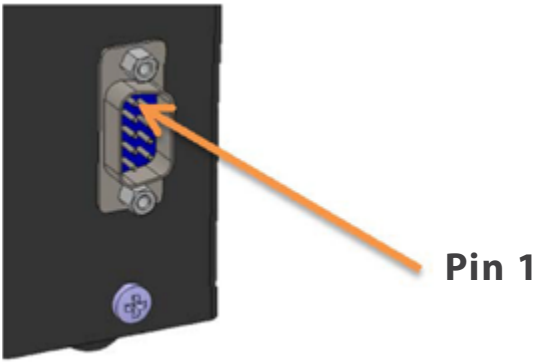
2. Verify whether the configuration of the PC Serial PORT is in accordance with the above indicated Protocol;

3. Verify the cable pin configuration:

DB9 Female	DB9 Female	Function
1	N/C	-
2	2	RxD
3	3	TxD
4	4	DTR
5	5	GND
6	N/C	-
7	7	RTS
8	N/C	-
9	N/C	-

4. Contact Gehaka Service Department.

5. Illustration of DB9 Connector pins, arrow indicates pin 1:

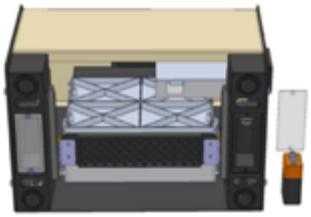


Battery replacement

Always use an Alkaline battery, since this type of battery does not leak chemical compounds over the years. Dispose the battery in a suitable way, because it is harmful to the environment.

The battery is installed in the meter bottom (right-hand foot) and to replace it follow the steps below:

1. Remove G650*i* from the mains
2. Remove the power cord from the meter
3. Remove the meter discharge drawer
4. Backward lie down the device in order to access the bottom
5. Remove the two screws from the right-hand side
6. Remove the battery releasing it from the clip
7. Install the new battery
8. Put the screws backs



When we switch the adapter connector off the mains, the G650*i* will continuously operate on the battery for a period of nearly 20 hours. In order to save battery, enable the "AUTO SWITCH OFF" function, then after 5 minutes without operation the G650*i* will automatically switch off.

If the battery voltage drops below the safety limit that ensures the proper operation of the device, the display will show the message "Replace Battery" and will stop performing measurements, thus indicating the need of battery replacement.

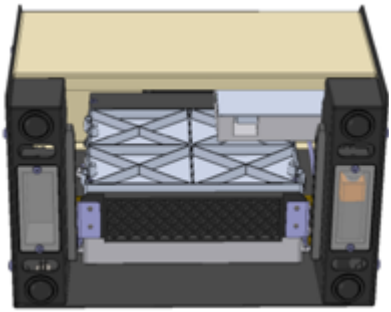
It should be noted that the display backlight only works when the G650*i* is connected to the Mains Adapter, in order to save battery energy.

Cleaning

Routine maintenance will basically consist on cleaning the moisture meter, keeping it free from dirt and dust, specially the Chamber. When measuring products such as rough rice, brans, etc., the Chamber tends to accumulate residues, especially when such cereals are very dry with a low relative humidity.

Never use compressed air for cleaning the chamber. Use a dry soft brush or paintbrush.

To clean the Chamber proceed as follows:



The Chamber cleaning may be performed using a soft bristle brush or paintbrush. Do not use liquids. Before performing the cleaning, the Chamber Door shall be carefully opened.

To open the door and performing the cleaning, proceed as follows:

1. Remove the Adapter from the rear panel and switch it off;
2. Lie down the G650*i* as shown in the picture;
3. Open the Chamber door with the chamber Knob;
4. Carefully perform the Chamber cleaning;
5. Connect the G650*i* again for operation.

For the G650*i* external cleaning use a cloth dampened with water.

Electronic components

Causes of electronic failures are minimized, since the moisture meter uses solid-state electronic components. The electronic circuitry is contained in a printed circuit board located inside the instrument panel. Its operation is not affected by dust and the microprocessor is able to detect any failure showing an error message on the display. In case of any failure, we recommend to return the G650*i* to Gehaka for the required meter repair and adjustment work.

Do not forget that any time the G650*i* is connected, the microcontroller performs a Self-Diagnosis that ensures its proper operation.

Error messages

Error 1 – Obstructed Chamber

An amount of sample or impurities could have been retained in the chamber, and with this exceeding the self-adjustment limits of the Chamber. Remove the drawer, use "5.6 Unlocking Chamber Door" function, disconnect G650*i* from the mains, turn the device backwards and open the chamber door, using a brush or paintbrush clean the chamber. See the proper procedure in "Cleaning".
If the error persists, there was a failure in the instrument; send the instrument to Gehaka Service Department.

Error 2 – Scale Failure

The electronic scale is not operating properly. This message indicates there was a failure in the G650*i* electronic scale. Observe whether there is some grain retained into the Loading Hopper edge, and whether the Hopper is totally free from the Hopper Protection.
If the error persists, there was a failure in the instrument; send the instrument to Gehaka Service Department.

Error 3 – Low Sample Temp.!
Error 4 – High Sample Temp.!

Indicates that the SAMPLE temperature is either below 0ºC or above 50ºC.
Wait until the sample temperature is balanced with the room temperature before performing the measurement.

If the error persists, there was a failure in the instrument; send the instrument to Gehaka Service Department.

Error 5 – Low Instrum. Temp.!
Error 6 – High Instrum. Temp.!

Indicates that the INSTRUMENT temperature is either below 0ºC or above 50ºC.
This is a protection for the good performance of G650*i* electronics. Operate the instrument in a room temperature between the allowed ranges.

If the error persists, there was a failure in the instrument; send the instrument to Gehaka Service Department.

Error 7 - Delta Temp. > 15ºC

This error indicates that the temperature difference between the instrument and the sample is greater than 15ºC. Wait for some minutes with the sample in the G650*i* drawer so this difference stays below 15ºC. It is recommended that the sample temperature and instrument temperature shall be as close as possible, whenever possible.

If the error persists, there was a failure in the instrument; send the instrument to Gehaka Service Department.

Error 8 – Low Sample Weight!
Error 9 – High Sample Weight!

After having the sample weight within the limits, a final verification is made after loading; if the amount of sample used is outside the limits that G650*i* is able to correct, this sample will be unloaded. Increase or reduce the amount of sample to correct the error.

If the error persists, there was a failure in the instrument; send the instrument to Gehaka Service Department.

Erro 10 - Umid. Amostra Baixa!
Erro 11 - Umid. Amostra Alta!

The G650*i* was calibrated using the standard oven method, and its precision is ensured in the range where the tests and the adjustment were performed. When the measurement is out of this range, the G650*i* will display this message. If the measurement is actually out of the scale range, we recommend creating a new Equation using the resources in the website ***www.moisturetester.com.br***. See item "5.8 Uploading Internet equation" for more details of the procedure.

Error 12 - Access Locked!

This message is displayed when we attempt to enter the "Configuration" function without the Hard Lock key that releases the access to that function. This key shall be installed in the G650*i* serial output. It is the security resource to prevent G650*i* parameters from being inadvertently changed.

Error 50 - MEM C Call Service
Error 51 - MEM D Call Service
Error 52 - RTC Call Service
Error 53 - TRIM Call Service
Error 54 - A/D Call Service
Error ?? - Call Service

When G650*i* is connected, it performs a self-diagnosis, ensuring the equipment will make reliable measurements.

In addition to this test, a verification will be also made at each measurement, and, if errors were found, the above stated messages will be issued.

These messages indicate a G650*i* hardware fault, and makes its operation impossible, send the instrument to Gehaka Service Department.

Extreme conditions

Ice or Snow

Samples containing ice or snow will not be satisfactorily measured. Frozen samples may be analyzed provided they are left to heat up in a hermetically closed container to get them closer to room temperature. Use the average value of 3 or more readings. Below the temperature range of 5ºC, perform 3 readings and use the average value.

Surface Moisture

Grains obtained from a warmed warehouse when getting in touch with humid air develop a surface moisture. The same occurs with some cereals uncovered during a rainfall, which will keep surface moisture for some days unless an artificial heat is applied for drying them. Surface moisture presents very low impedance to the high-frequency current flow, thus incorrect readings will be obtained.

Moisture Measurement Processes

There are two methods for measuring moisture in cereals: the primary one and the secondary one. The primary method consists on a procedure using the vented oven. This procedure is time-consuming and would not obviously be convenient for use on grain reception. For this reason, the secondary method was developed, so that using the cereal electrical properties, quick measurements can be made.

Although research works and technological developments have been carried out in the field of electronics and also on the properties of cereals, it is not possible to analyze the cereal without some variation. Some of the involved facts are discussed below.

We recommend that the product to be measured in the G650*i* shall be clean and free from any impurities that could interfere in the moisture measurement. We should consider that, during the instrument calibration process with the oven, it was always used the product clean.

Unfortunately, a cereal cannot be measured until the harvest is completed and the calibration cannot be modified until the measurement of a sufficient number of samples, in order to be able to determine the change in the cereal electrical properties.

The size of the seed does also affect the test quality. Corn is an example of a difficult cereal to be measured, due to the irregular size and shape of the seed. In fact, there are nearly 400 different varieties, maturing in 90 to 125 days. It is evident that, the issue of precision in moisture measurement is the on-going increase in the variation of the electrical properties.

Cereal moisture measurement is significantly affected in its accuracy by moisture and temperature range, cereal density, low temperature, mold or swelling. Moisture meters are calibrated with quality grain seeds, and certain attempts of measuring electrical properties on crushed or broken grains, or on grains with a high content of foreign matter, will certainly impair the results.

We do not only have different cereals, such as wheat, barley, corn, soybean, rice and others, but we also have a number of variations of each type of cereal. Each cereal creates its own problem for moisture measurement. With new efforts, new hybrid cereals are developed and the electrical properties of these cereals may slightly change, as for example, the grain density measurement.

Different regions of the country, different methods of cultivation under development, and the soils have to be taken into consideration when trying to obtain average values for calibrating a moisture meter to be used throughout the country.

In the operation of every moisture meter, the duly specified operations shall be performed. A representative sample of the batch shall be collected, and the moisture and temperature range shall be observed. The moisture meter shall be checked at least annually to ensure the reliability of results.

We encourage your involvement in the development of calibrations, and we ask you to contribute to our work by supplying samples or goods with the calibration under development. Gehaka offers a specific laboratory for moisture measurement and, with these results it is possible to improve the performance of moisture meters.

Technical specifications

Number of Scales	68 factory set, it can receive up to 250 scales.
Moisture	
Range	Depends on the product, see table.
Moisture scale interval	0.1% or 0.01% selectable.
Precision	±0.25% related to oven in the scale range.
Moisture limits	Depending on the product, see each one.
Scale	
Range	From 0 to 1,000g
Scale interval	0.1g
Precision	±0.2g
Sample weight	Depending on each product.
Sample Thermometer	
Operating range	0º - 100ºC
Scale interval	0.1ºC
Precision	±0.3ºC
Function	Sample temperature automatic correction, within 2 - 15 seconds, depending on the temperature diference between the sample and G650i. Correction range from 0ºc to 50ºC.
Instrument Thermometer	
Operating range	0º to 100ºC
Scale interval	0.1ºC
Precision	±0.3ºC
Function	Monitors G650i operational temperature and the difference between the sample and the instrument
Data Output	Serial RS232C Bidirectional.
Printer (*OPTIONAL)	
Printing method	Thermal
Density	203dpi x 406dpi
Paper	White, thermal W = 56mm x Dia = 40mm.
Printing life	10 years (Gehaka Paper).
Speed	5.3 lines/sec.
Paper feed rate	45mm/sec.
Estimated life	30 million lines.
Weight	5.7Kg
Dimensions	345 x 311 x 192mm
Power supply	Full range of 90V to 240VAC adapter.
Operating temp.	Room temperature between 0º to 45ºC.
Accessories	Instruction manual 9V battery installed Mains adapter Brush for chamber cleaning

Standard Products in this version and operating ranges for each Product:

PRODUCT	CURVE NR	MIM HUMI	MAX HUMI	SAMPLE WEIGHT
Almond Nat 100g	9704	3	30	100
Runner Peanuts	9701	1	30	142
Rice Brown	11359	5	30	142
Rice Parboiled	9764	5	30	142
Rice Polished Na	9763	5	30	142
Rice Rough	11360	7	30	142
Parboiled Rice	9673	7	30	142
Rice Cateto POL	9745	9	25	142
Rice Inte Parbo	9765	10	25	142
Arroz Quirera	9782	5	25	142
Oats	9665	6	22	142
Oats Rough 85g	9726	7	35	85
Oats Rough Black	9727	7	35	85
Azevem	9756	5	25	57
Cocoa Beans 100g	9766	4	22	100
Coffee Brazil	9731	9	25	142
Coffee DryCherry	9769	20	50	113
Coffee ISO6673	9760	7	25	142
Coffee Oro	9685	7	35	142
Coffee Parchment	9774	6	55	142
Coffee Roast 85g	9736	2	15	85
Canola	9730	5	30	142
Coffee Hull	9755	3	30	57
Cashew Nuts	9722	1	15	142
Brazil Nut	9705	2	15	120
Rye	9686	6	40	142
Rye Flakes	9687	5	15	142
Barley	9775	9	30	142
Chia	9688	5	15	142
Coriander 75g	9706	5	20	75
Rapeseed	9689	7	17	142
Crambe	9718	4	20	113

Standard Products in this version and operating ranges for each Product:

PRODUCT	CURVE NR	MIM HUMI	MAX HUMI	SAMPLE WEIGHT
Clove	9703	10	25	80
Crotalaria	9729	7	20	142
Pea	9666	6	20	142
Peanuts Meal	10038	1	15	142
Canola Meal	9724	8	18	105
Citrus Meal	9707	8	16	80
Soybeans Meal	9770	6	24	142
Sunflower Meal	9723	7	19	72
Sorghum Meal	10051	8	20	142
Beans Nano	9708	10	25	165
Beans Azuki	9746	8	25	142
Beans Turtle	9675	6	35	184
Beans White	9676	7	35	175
Beans Pinto	9761	5	35	170
Red Eye Beans	9667	5	30	142
Beans Blackeyed	9677	6	35	165
Beans Peruvian	9678	5	25	165
Beans Cowpea	9679	10	25	161
Feijao Mungo Ver	9777	8	25	142
Beans Pearl	9728	9	40	157
Beans Gold	9668	5	30	142
Beans Black	11361	8	35	165
Beans Colored	9719	6	35	170
Beans Pink	9680	6	30	183
Beans Red	9681	6	30	180
Sesame White	9747	2	16	117
Sesame Skinned	9748	2	15	117
Sesame Black	9737	2	15	117
Sunflower	9709	5	25	75
Sunflower Peeled	9738	3	15	142
Chickpea	9759	5	35	175
Guarana Shelled	9690	7	25	142

Standard Products in this version and operating ranges for each Product:

PRODUCT	CURVE NR	MIM HUMI	MAX HUMI	SAMPLE WEIGHT
Lentil	9691	7	30	142
Flaxseed Brown	9692	6	18	142
Flax	9669	6	17	142
Macadamia	9693	1	40	142
Castor Beans	9694	4	18	142
Millet	9711	7	40	142
Corn	11363	7	50	142
Popcorn	9695	5	35	142
Yellow Mustard	9674	7	30	142
Blackpepper	9757	6	30	142
Barbados Nut	9696	6	35	142
Quinoa White	9754	7	21	170
Quinoa Black	9752	7	21	170
Quinoa Red	9753	7	21	170
Cotton Seed	9713	6	22	128
Birdseed	9714	2	50	160
Seed Onion	9767	3	15	113
Seed Cumaru	9773	4	32	142
Forage Turnip	9698	5	15	142
Niger Seed	9715	2	50	124
Millet Seed	9716	2	50	151
Goosegrass	9717	2	50	166
Millet White	9697	9	20	142
Soybeans	11364	8	40	142
Sorghum	9720	7	40	142
Wheat	11365	5	40	142
Buckwheat	9725	10	35	100
Wheat Red	9671	5	40	142
Triticale	9672	5	33	142
Annatto	9699	7	30	142

Warranty

The information in this manual is regarded correct until the date of its publication, as stated in the sales invoice of the product.

Gehaka will not assume any liability resulting from the improper use or misuse of this product, and also assumes no liability for non-observance of the information stated in this manual, and it reserves the right to modify it without previous notice.

Gehaka refuses any direct or indirect liability for accidents, damages, loss and profits, good or bad results on analyses, processing, purchase or sale of goods based on this instrument. The devices sold are guaranteed against failures of material or craftsmanship, for a period of one year from the date of manufacture or sale.

The responsibility of Gehaka under this warranty is limited to the repair or replacement, or optional credit granted, of any products returned by the user/buyer during the warranty period.

This warranty does extend to the coverage of damages or malfunction caused by fire, accident, modification, carelessness, improper use, repair or maintenance without authorization of the manufacturer, or even by negligence, malpractice and imprudence in the use.

Gehaka does not expressly or implicitly assumes any liability, except hereby notified.
Gehaka does not guarantee the continuity of merchantability of this product, or its suitability for a given purpose.

The responsibility of Gehaka is limited to the unit sales price, as stated in the sales invoice or price schedule, of any defective good, and it will not include the repair of losses and other material and/or moral damages, profit loss or any other consequential damages arising from the use of the equipment, other than those previously provided.

The warranty validity of this product is one year, starting from the date of the invoice issued. However, the guarantee period for the painting is thirty days, starting from the date of the invoice issued.

The product requiring service during the warranty period shall have the freight to Gehaka and return to customer paid by the Customer.

Gehaka's salespersons or sales representatives are not authorized to offer any additional warranty other to that described in this Manual.

December/2022

TECHNOLOGY AT THE CUSTOMER'S SERVICE

CONTACTS

gehaka.com.br/en

+55 (11) 2165-1100

vendas@gehaka.com.br

@gehakaoficial

/gehakaoficial

/gehakaoficial

/GehakaEquipamentos

Av. Duquesa de Goiás, 235 - Real Parque - CEP 05686-900 - São Paulo/SP - Brasil